



Lehigh Testing Laboratories, Inc.

Materials Testing - Failure Analysis - Materials Engineering



About Us

Lehigh Testing Laboratories, Inc. is an employee owned (ESOP) Materials Testing, Engineering and Consulting firm. We have been providing professional services since 1955, and are part of the MMR Group, Inc.

The Group includes three divisions, each with its own staff and laboratory to collectively serve diverse markets and locations. We have extensive experience with metals and non-metals, such as plastics, ceramics, and composites.

We provide services to diverse industries including petrochemical refining, aerospace, transportation, commercial manufacturing, chemical, military, nuclear, and power generation.

We also provide forensic Engineering, materials engineering, consulting, and expert witness services to the legal and insurance professions as well.

Our Experts versed in many aspects of material science and commercial manufacturing processes. They are equally versed in the processes and procedures of providing legal depositions and professional courtroom testimony.

We have multiple accreditations and numerous independent vendor approvals.

Scanning Electron Microscopy

Our JEOL 820 scanning electron microscope (SEM) features a large chamber which can be accessed in vent-down mode for oversize components, and a small side-entry port for analysis of smaller samples.

We also perform energy dispersive spectroscopy (EDS) analysis using an Oxford Instruments light element detector equipped with a 4 Pi EDS analysis system.



- Fracture evaluations of failed components at high magnifications.
- Particle Analysis- Size, Distribution, and Identification.
- Image analysis capabilities using digital imaging including dimensional evaluation and particle sizing.
- Semi-quantitative composition analysis of elements and oxides.
- Contamination analysis of residues and surface conditions.
- Light element detection and analysis.
- EDS analysis of specified multiple points and defined areas within a defined field. Dot mapping of regions to determine presence of specified elements.
- Line scan capabilities to detect changes in relative concentrations.

IRIS© - Ultrasonic 'B' Scan Inspection Method

The Ultrasonic Internal Rotating Inspection System (*IRIS*©) is one of the most accurate, up-to-date, and reliable technologies for the inspection of heat exchanger and boiler tubes in use today.

IRIS inspection is an ultrasonic immersion pulse echo technique. It uses an ultrasonic transducer that is contained in a test head and is self-centered within the tube being examined.

Ultrasonic pulses are emitted along a path parallel to the tube axis, the pulses are then reflected by a rotating mirror at a 45° angle and directed radially onto the tube wall. As the mirror rotates, the ultrasonic beam is traversed around the tube circumference and each successive pulse is mapped out on the screen of the IRIS© system. There are nearly 200 readings per revolution and over 2300 revolutions per minute.

Unlike Eddy current inspections, the data provided does not require special interpretation or guess work, and a report can be supplied immediately following the inspection. There is also increased reliability with IRIS© because the ultrasonic technique is quantitative. It can distinguish between external and internal conditions, and is not affected by the construction of the bundle (i.e. stiffeners, baffles, tube sheet and supports).

LTL has the necessary experience and certified inspectors to provide complete Mechanical Integrity Inspection programs. From development to implementation to ongoing program maintenance, we assist you throughout the entire inspection process.



Projects & Cases : Interesting & Intriguing Cases

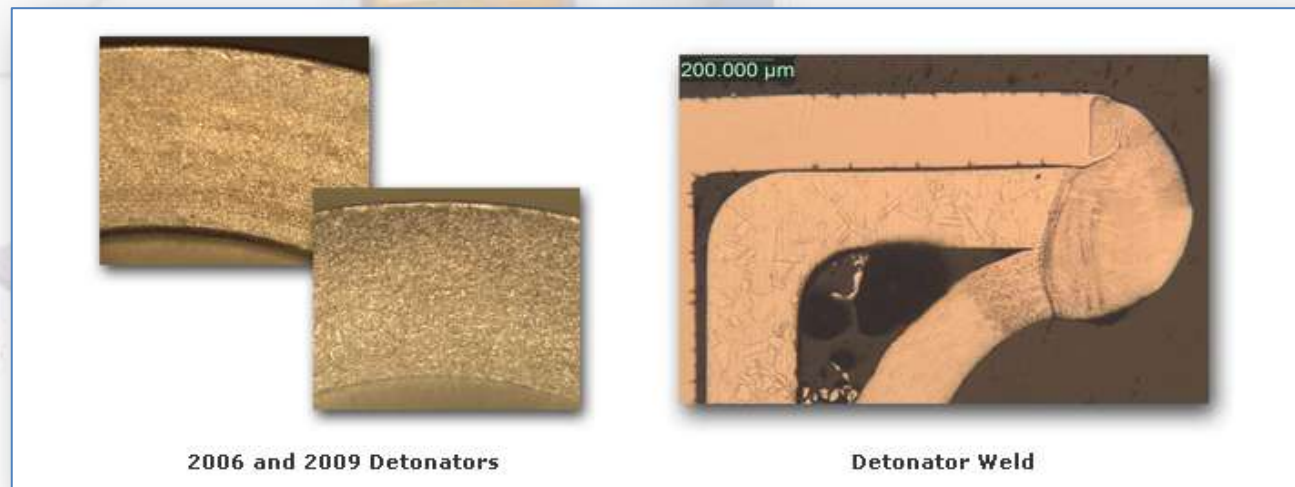
Detonator Case Study:

A manufacturer of detonator caps was failing to achieve 100% fusion during welding with components supplied in 2009. No such difficulties were observed in material supplied in 2006. Assembled caps and individual components were supplied for comparative evaluation.

The 2009 plug was observed to have an oxidized surface. Oxidation was sufficient to hide machining marks observed on 2006 plugs.

Microscopic examination of fabricated welded caps revealed incomplete fusion in the weld (as evidenced by the presence of a crack at the weld root – black arrow) and oxidized thermal cracks along the length of the 2009 plug surfaces (yellow arrow). These features were not found in the examined 2006 cap.

The welding difficulties were attributed to oxidized plugs supplied in 2009.



Gymnasium Roof Collapse

A high school gymnasium roof in Virginia collapsed under a load of over 20 inches of snow. The vertical support in a roof truss had buckled. Cell phone pictures taken while the gymnasium was being evacuated showed the top of a roof truss pulling to the side just before roof failure.

Evaluation of truss structural members revealed that the collapse occurred when the truss vertical support had buckled, with the vertical member bent below its base support.. At that point the support had fractured and the now unsupported roof had collapsed.



Ejected
Electron